CLAIMS

1. A polynucleotide comprising a polynucleotide selected from the group consisting of:

(a) a polynucleotide having the nucleic acid sequence of SEQ ID NO: 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 17;

(b) a polynucleotide encoding a polypeptide having the amino acid sequence of SEQ ID NO: 28, 29, 30, 31, 32 or 33;

(c) a polynucleotide having a nucleic acid sequence with at least 70%, preferably at least 75%, at least 80%, at least 85%, at least 90% or at least 95% sequence identity to an OCT1 gene, wherein said polynucleotide is having a nucleotide exchange or a nucleotide deletion of at least one nucleotide at a position 109130, 109211, 119220, 123551, 126806, 126846, 126863 to 126865, 126922, 126915, 130672, 141819, 142951, 141961 or 142993 of the OCT1 gene (GenBank Accession No: GI:9581607).

(d) a polynucleotide capable of hybridizing to an OCT1 gene, wherein said polynucleotide is having a substitution of at least one nucleotide at a position corresponding to position 109130, 109211, 119220, 123551, 126806, 126846, 126922, 126915, 130672, 141819, 142951, 141961 or 142993 of the OCT1 gene (GenBank Accession No: GI:9581607) or a deletion of three nucleotides at a position corresponding to position 126863 to 126865 of the OCT1 gene (GenBank Accession No: GI:9581607);

(e) a polynucleotide capable of hybridizing to an OCT1 gene, wherein said polynucleotide is having an A at a position corresponding to position 126806, 141819, 142951 or 142993 of the OCT1 gene (GenBank Accession No: GI: 9581607), a C at a position corresponding to position 109211 or 126846 of the OCT1 gene (GenBank Accession No: GI: 9581607), a G at a position corresponding to position 126922 or 130672 of the OCT1 gene (GenBank Accession No: GI: 9581607), a T at a position corresponding to position 109130, 119220, 123551, 126915 or 141961 of the OCT1 gene (GenBank Accession No: GI:

9581607) or an ATG deletion at a position corresponding to position 126863 to 126865 of the OCT1 gene (GenBank Accession No: GI:9581607);

(f) a polynucleotide encoding an OCT1 polypeptide or fragment thereof, wherein said polypeptide comprises an amino acid substitution at position 61, 88, 401, 414 or 465 of the OCT1 polypeptide (GenBank Accession No:GI:2511670); and

(g) a polynucleotide encoding an OCT1 polypeptide or fragment thereof, wherein said polypeptide comprises an amino acid substitution of R to C at position 61, an amino acid substitution of C to R at position 88, an amino acid substitution of G to S at position 401, an amino acid substitution of G to A at position 414, an amino acid deletion of M at position 420 or an amino acid substitution of G to R at position 465 of the OCT1 polypeptide (GenBank Accession No: GI:2511670).

2. The polynucleotide of claim 1, wherein said polynucleotide is associated with side effects, or reduced activity of drug-therapy, or non-activity of drug therapy as a result from aberrant serum and/or intracellular concentrations of compounds that are substrates of the transporter OCT1.

3. The polynucleotide of claim 1 or 2 which is DNA or RNA.

4. A gene comprising the polynucleotide of claim 1 or 2.

5. The gene of claim 4, wherein a nucleotide deletion and/or substitution results in altered expression of the variant gene compared to the corresponding wild type gene.

6. A vector comprising a polynucleotide of any one of claims 1 to 3 or the gene of claim 4 or 5.

7. The vector of claim 6, wherein the polynucleotide is operatively linked to expression control sequences allowing expression in prokaryotic or eukaryotic cells or isolated fractions thereof.

8. A host cell genetically engineered with the polynucleotide of any one of claims 1 to 3, the gene of claim 4 or 5 or the vector of claim 6 or 7.

9. A method for producing a molecular variant OCT1 polypeptide or fragment thereof comprising
   (a) culturing the host cell of claim 8; and
   (b) recovering said protein or fragment from the culture.

10. A method for producing cells capable of expressing a molecular variant OCT1 polypeptide comprising genetically engineering cells with the polynucleotide of any one of claims 1 to 3, the gene of claim 4 or 5 or the vector of claim 6 or 7.

11. A polypeptide or fragment thereof encoded by the polynucleotide of any one of claims 1 to 3, the gene of claim 4 or 5 or obtainable by the method of claim 9 or from cells produced by the method of claim 10.

12. An antibody which binds specifically to the polypeptide of claim 11.

13. The antibody of claim 12 which specifically recognizes an epitope containing one or more amino acid substitution(s) resulting from a nucleotide exchange as defined in claim 1 or 5.

14. The antibody of claim 12 or 13 which is monoclonal or polyclonal.

15. A transgenic non-human animal comprising at least one polynucleotide of any one of claims 1 to 3, the gene of claim 4 or 5 or the vector of claim 6 or 7.

16. The transgenic non-human animal of claim 15 which is a mouse, a rat or a zebrafish.

17. A solid support comprising one or a plurality of the polynucleotide of any one of claims 1 to 3, the gene of claim 4 or 5, the vector of claim 6 or 7, the polypeptide of claim 11, the antibody of claim 12 or 13 or the host cell of claim 8 in immobilized form.

18. The solid support of claim 17, wherein said solid support is a membrane, a glass-or polypropylene- or silicon-chip, are oligonucleotide-conjugated beads or a bead array, which is assembled on an optical filter substrate.

19. An in vitro method for identifying a single nucleotide polymorphism said method comprising the steps of:

(a) isolating a polynucleotide of any one claims 1 to 3 or the gene of claim 4 or 5 from a plurality of subgroups of individuals, wherein one subgroup has no prevalence for an OCT1 associated disease and at least one or more further subgroup(s) do have prevalence for an OCT1 associated disease; and

(b) identifying a single nucleotide polymorphism by comparing the nucleic acid sequence of said polynucleotide or said gene of said one subgroup having no prevalence for an OCT1 associated disease with said at least one or more further subgroup(s) having a prevalence for an OCT1 associated disease.

20. A method for identifying and obtaining a pro-drug or a drug capable of modulating the activity of a molecular variant of an OCT1 polypeptide comprising the steps of:

(a) contacting the polypeptide of claim 11, the solid support of claim 17 or 18, a cell expressing a molecular variant gene comprising a polynucleotide of any one of claims 1 to 3, the gene of claim 4 or 5 or the vector of claim 6 or 7 in the presence of components capable of

providing a detectable signal in response to drug activity with a compound to be screened for pro-drug or drug activity; and

(b) detecting the presence or absence of a signal or increase or decrease of a signal generated from the pro-drug or the drug activity, wherein the absence, presence, increase or decrease of the signal is indicative for a putative pro-drug or drug.

21. A method for identifying and obtaining an inhibitor of the activity of a molecular variant of an OCT1 polypeptide comprising the steps of:

(a) contacting the protein of claim 11, the solid support of claim 17 or 18 or a cell expressing a molecular variant gene comprising a polynucleotide of any one of claims 1 to 3 or the gene of claim 4 or 5 or the vector of claim 6 or 7 in the presence of components capable of providing a detectable signal in response to drug activity with a compound to be screened for inhibiting activity; and

(b) detecting the presence or absence of a signal or increase or decrease of a signal generated from the inhibiting activity, wherein the absence or decrease of the signal is indicative for a putative inhibitor.

22. The method of claim 20 or 21, wherein said cell is a cell of claim 8, obtained by the method of claim 10 or can be obtained by the transgenic non-human animal of claim 15 or 16.

23. A method of identifying and obtaining a pro-drug or drug capable of modulating the activity of a molecular variant of an OCT1 polypeptide comprising the steps of:

(a) contacting the host cell of claim 8, the cell obtained by the method of claim 10, the polypeptide of claim 11 or the solid support of claim 17 or 18 with the first molecule known to be bound by an OCT1 polypeptide to form a first complex of said polypeptide and said first molecule;

(b) contacting said first complex with a compound to be screened, and

(c) measuring whether said compound displaces said first molecule from said first complex.

24. A method of identifying and obtaining an inhibitor capable of modulating the activity of a molecular variant of an OCT1 polypeptide comprising the steps of:

(a) contacting the host cell of claim 8, the cell obtained by the method of claim 10, the protein of claim 11 or the solid support of claim 17 or 18 with the first molecule known to be bound by an OCT1 polypeptide to form a first complex of said polypeptide and said first molecule;

(b) contacting said first complex with a compound to be screened, and

(c) measuring whether said compound displaces said first molecule from said first complex.

25. The method of claim 23 or 24, wherein said measuring step comprises measuring the formation of a second complex of said polypeptide and said compound.

26. The method of any one of claims 23 to 25, wherein said measuring step comprises measuring the amount of said first molecule that is not bound to said polypeptide.

27. The method of any one of claims 23 to 26, wherein said first molecule is labeled.

28. A method for the production of a pharmaceutical composition comprising the steps of the method of any one of claims 20 to 27; and the further step of formulating the compound identified and obtained or a derivative thereof in a pharmaceutically acceptable form.

29. A method of diagnosing a disorder related to the presence of a molecular variant of an OCT1 gene or susceptibility to such a disorder comprising determining the presence of a polynucleotide of any one of claims 1 to 3 or the gene of claim 4 or 5 in a sample from a subject.

30. The method of claim 29 further comprising determining the presence of a polypeptide of claim 11 or the antibody of any one of claims 12 to 14.

31. A method of diagnosing a disorder related to the presence of a molecular variant of an OCT1 gene or susceptibility to such a disorder comprising determining the presence of a polypeptide of claim 11 or the antibody of any one of claims 12 to 14 in a sample from a subject.

32. The method of any one of claims 29 to 31, wherein said disorder comprises side effects, or reduced activity of drug therapy, or non-activity of drug therapy as a result from aberrant serum and/or intracellular concentrations of compounds that are substrates of the transporter OCT1.

33. The method of any one of claims 29 to 32 comprising DNA sequencing, hybridisation techniques, PCR based assays, fluorescent dye and quenching agent-based PCR assay (Taqman PCR detection system), RFLP-based techniques, single strand conformational polymorphism (SSCP), denaturating gradient gel electrophoresis (DGGE), temperature gradient gel electrophoresis (TGGE), chemical mismatch cleavage (CMC), heteroduplex analysis based system, techniques based on mass spectroscopy, invasive cleavage assay, polymorphism ratio sequencing (PRS), microarrays, a rolling circle extension assay, HPLC-based techniques, DHPLC-based techniques, oligonucleotide extension assays (OLA), extension based assays (ARMS, (Amplification Refractory Mutation System), ALEX (Amplification Refractory Mutation Linear Extension), SBCE (Single base chain extension), a molecular beacon assay, invader (Third wave technologies), a ligase chain reaction assay, 5'-nuclease assay-based techniques, hybridization capillary array electrophoresis (CAE), pyrosequencing, protein truncation assay (PTT), immunoassays, haplotype analysis, and solid phase hydridization (dot blot, reverse dot blot, chips).

34. A method of detection of the polynucleotide of any one of claims 1 to 3 or the gene of claim 4 or 5 in a sample comprising the steps of

(a) contacting the solid support of claim 17 or 18 with the sample under conditions allowing interaction of the polynucleotide of claim 1 to 3 or the gene of claim 4 or 5 with the immobilized targets on a solid support and;

(b) determining the binding of said polynucleotide or said gene to said immobilized targets on a solid support.

35. An in vitro method for diagnosing a disease comprising the steps of the method of claim 34, wherein binding of said polynucleotide or gene to said immobilized targets on said solid support is indicative for the presence or the absence of said disease or a prevalence for said disease.

36. A diagnostic composition comprising the polynucleotide of any one of claims 1 to 3, the gene of claim 4 or 5, the vector of claim 6 or 7, the polypeptide of claim 11 or the antibody of any one of the claims 12 to 14.

37. A pharmaceutical composition comprising the polynucleotide of any one of claims 1 to 3, the gene of claim 4 or 5, the vector of claim 6 or 7, the polypeptide of claim 11 or the antibody of any of the claims 12 to 14.

38. Use of the polynucleotide of any one of claims 1 to 3, the gene of claim 4 or 5, the vector of claim 6 or 7, the polypeptide of claim 11, the polynucleotides having the polynucleotide sequences of SEQ ID NO: 18, 19, 20, 21, 22, 23, 24, 25, 26 or 27, the polypeptide of SEQ ID NO: 34 or 35, or the antibody of any of claims 12 to 14 for the preparation of a diagnostic composition for diagnosing a disease.

39. Use of the polynucleotide of any one of claims 1 to 3, the gene of claim 4 or 5, the vector of claim 6 or 7, the polypeptide of claim 11, the polynucleotides having the polynucleotide sequences of SEQ ID NO: 18, 19, 20, 21, 22, 23, 24, 25, 26 or 27, the polypeptide of SEQ ID NO: 34 or 35, or the antibody of any of the claims 12 to 14 for the preparation of a pharmaceutical composition for treating a disease.

40. The use of claim 38 or 39, wherein said disease comprises side effects, or reduced activity, or non-activity of drug therapy as a result from aberrant serum and/or intracellular concentrations of compounds that are substrates of the transporter OCT1.

41. A diagnostic kit for detection of a single nucleotide polymorphism comprising the polynucleotide of any one of claims 1 to 3, the gene of claim 4 or 5, the vector of claim 6 or 7, the polypeptide of claim 11, the antibody of any of the claims 12 to 14, the host cell of claim 8, the transgenic non-human animal of claim 15 or 16 or the solid support of claim 17 or 18.